MCR100W-10M

SCR

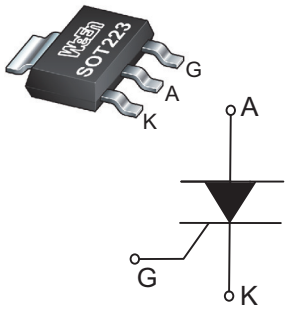
Rev.01 - 27 August 2021 Product data sheet

1. General description

Planar passivated SCR with sensitive gate in a SOT223 surface mountable plastic package. This SCR is designed to be interfaced directly to microcontrollers, logic integrated circuits and other low power gate trigger circuits.

2. Features and benefits

- On-state RMS current, 1.25 A
- Repetitive peak off-state voltage, 1000 V
- High surge current capability
- Direct triggering from low power drivers and logic ICs
- Planar passivated for voltage ruggedness and reliability
- Surface mountable package



3. Applications

- GFCI (Ground Fault Circuit Interrupter)
- AFCI (Arc Fault Circuit Interrupter)
- RCD (Residual Current Device)
- RCBO (Residual Current circuit Breaker with Overload protection)
- AFDD (Arc Fault Detection Device)

4. Quick reference data

Table 1. Quick reference data

Symbol	Values	Unit
V_{DRM}, V_{RRM}	1000	V
$I_{T(RMS)}$	1.25	A
I_{GT}	≤90	μA
T_j	125	°C

5. Characteristics

Table 2. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Values	Unit
V_{DRM}	repetitive peak off-state voltage		1000	V
V_{RRM}	repetitive peak reverse voltage		1000	V
$I_{T(AV)}$	average on-state current	half sine wave; $T_c \leq 105$ °C	0.8	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_c \leq 105$ °C	1.25	A
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(init)} = 25$ °C; $t_p = 10$ ms	23	A
		half sine wave; $T_{j(init)} = 25$ °C; $t_p = 8.3$ ms	25	A
I^2t	I^2t for fusing	$t_p = 10$ ms; sine-wave pulse	2.645	A^2s
dI_T/dt	rate of rise of on-state current	$I_G = 0.1$ mA	100	A/µs
I_{GM}	peak gate current		1.2	A
P_{GM}	peak gate power		2	W
$P_{G(AV)}$	average gate power	over any 20 ms period	0.2	W
T_{stg}	storage temperature		-40 to 150	°C
T_j	junction temperature		-40 to 125	°C

Table 3. Electrical Characteristics

Symbol	Parameter	Conditions			Min	Typ	Max	Unit
Static characteristics								
I_{GT}	gate trigger current	$V_D = 12$ V; $R_L = 100$ Ω; $T_j = 25$ °C			10	-	90	µA
V_{GT}	gate trigger voltage	$V_D = 12$ V; $R_L = 100$ Ω; $T_j = 25$ °C			-	0.6	0.8	V
		$V_D = 800$ V; $I_T = 0.1$ A; $T_j = 125$ °C			0.25	0.4	-	V
V_{RG}	gate reverse voltage	$I_{RG} = 2$ mA			10	-	-	V
I_L	latching current	$I_T = 0.1$ A; $R_{GK} = 1$ kΩ; $T_j = 25$ °C			-	-	5	mA
I_H	holding current	$V_D = 12$ V; $R_{GK} = 1$ kΩ; $T_j = 25$ °C			-	-	3	mA
V_T	on-state voltage	$I_T = 2.5$ A; $T_j = 25$ °C			-	-	1.45	V
I_{DRM}	off-state current	$V_D = V_{DRM} / V_{RRM}$; $R_{GK} = 1$ kΩ	$T_j = 25$ °C		-	-	1	µA
I_{RRM}	reverse current		$T_j = 125$ °C		-	-	100	µA
Dynamic characteristics								
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 670$ V; $T_j = 125$ °C; $R_{GK} = 1$ kΩ; (V_{DM} = 67% of V_{DRM}); exponential waveform			50	-	-	V/µs

Table 4. Thermal characteristics

Symbol	Parameter	Conditions			Min	Typ	Max	Unit
$R_{th(j-c)}$	thermal resistance from junction to case		SOT223		-	-	20	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	SOT223		-	120	-	K/W

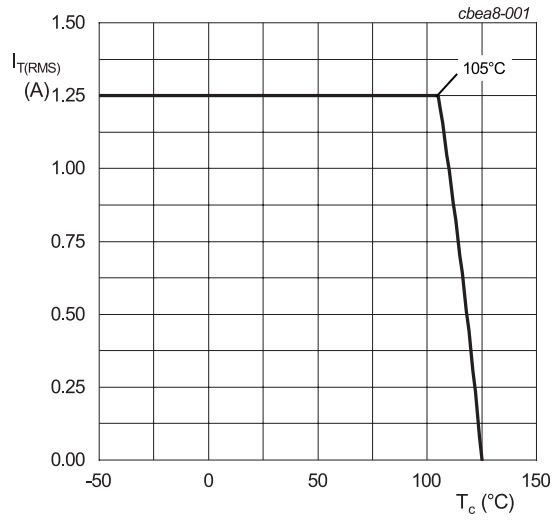
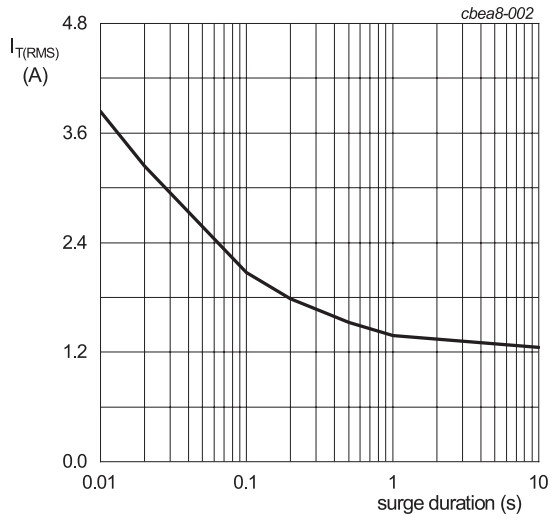
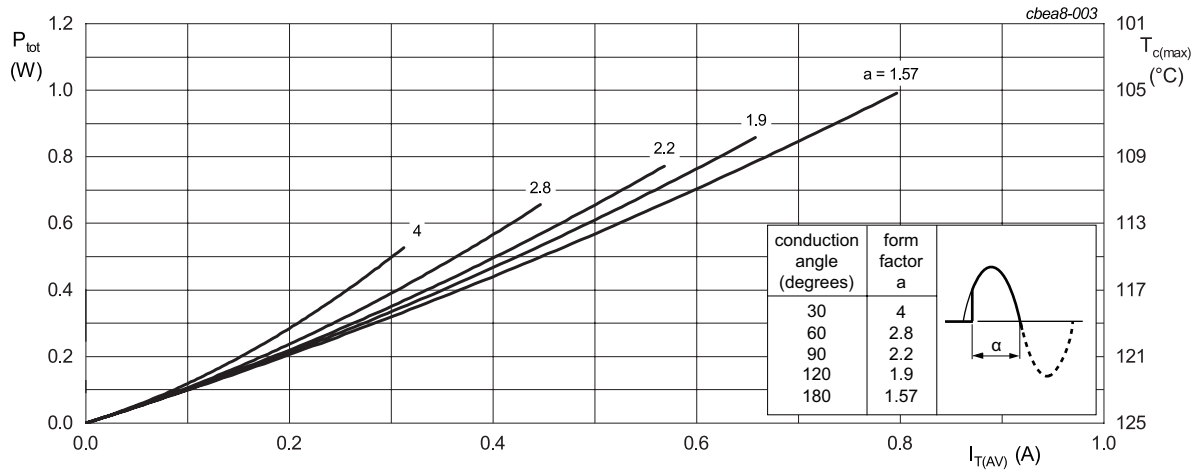


Fig. 1. RMS on-state current as a function of case temperature; maximum values



f = 50 Hz; $T_c \leq 105$ °C

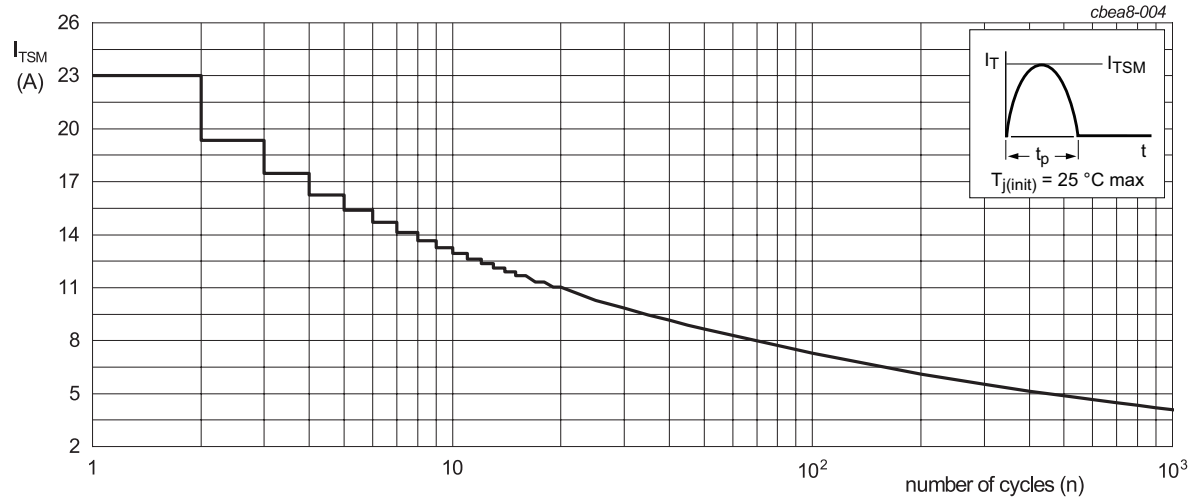
Fig. 2. RMS on-state current as a function of surge duration; maximum values



α = conduction angle

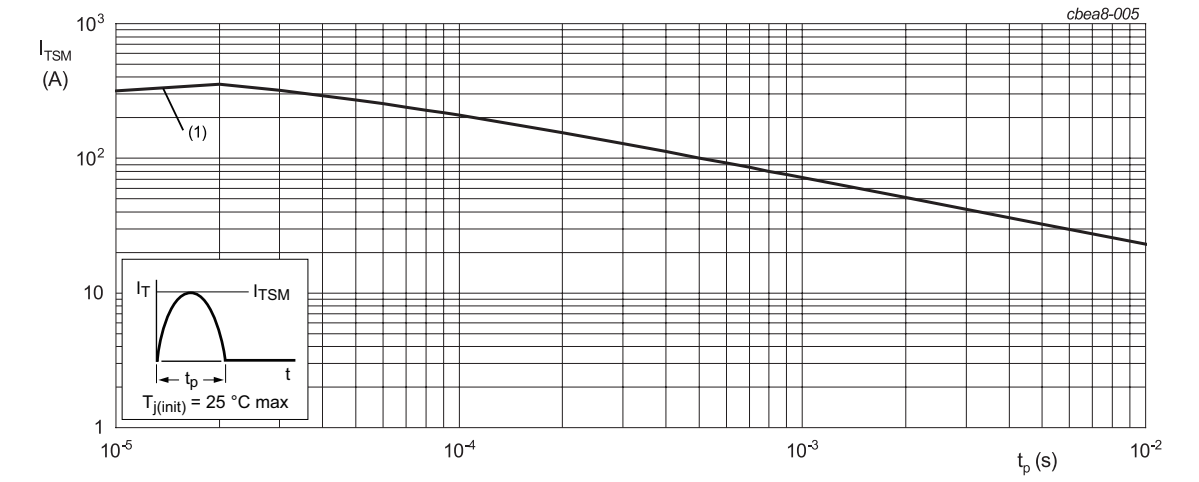
a = form factor = $I_{T(RMS)}$ / $I_{T(AV)}$

Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values



f = 50 Hz

Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values



$t_p \leq 10$ ms

(1) dI_T/dt limit

Fig. 5. Non-repetitive peak on-state current as a function of pulse duration; maximum values

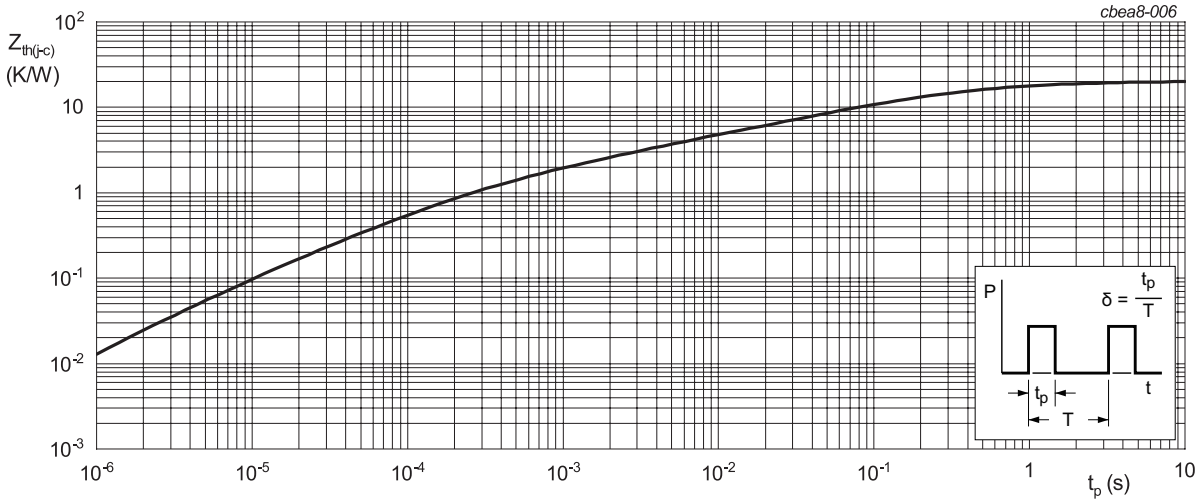


Fig. 6. Transient thermal impedance from junction to case as a function of pulse duration

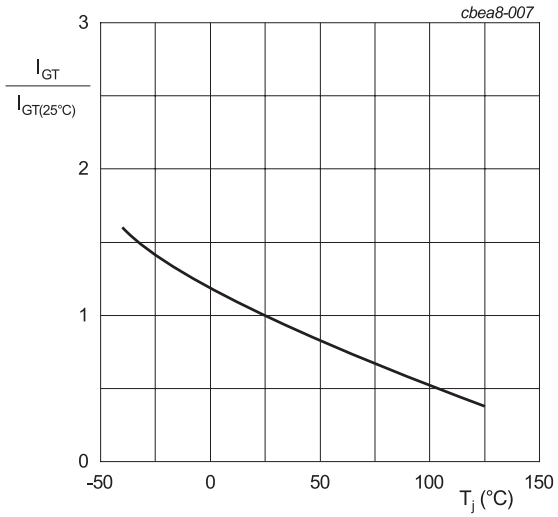


Fig. 7. Normalized gate trigger current as a function of junction temperature

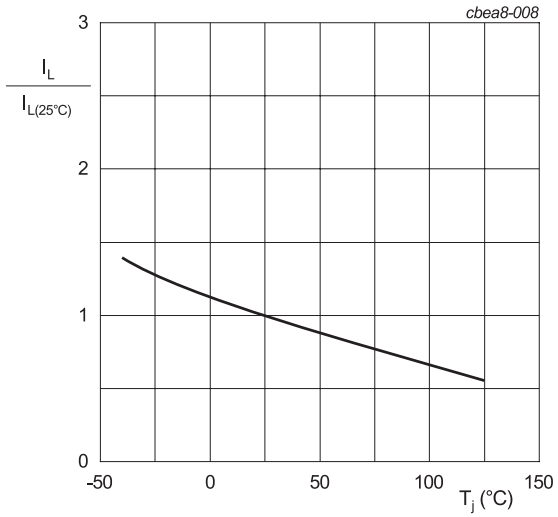


Fig. 8. Normalized latching current as a function of junction temperature

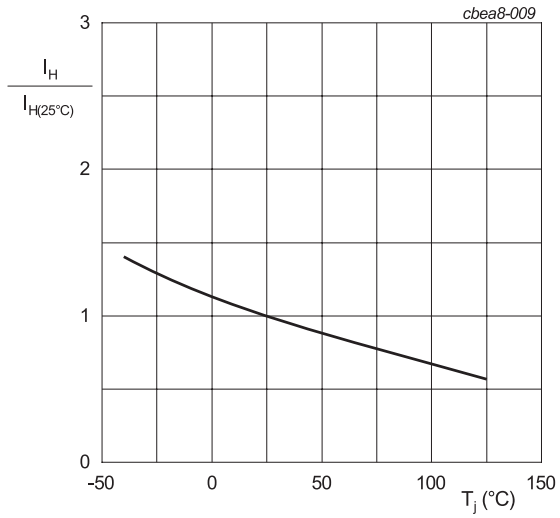
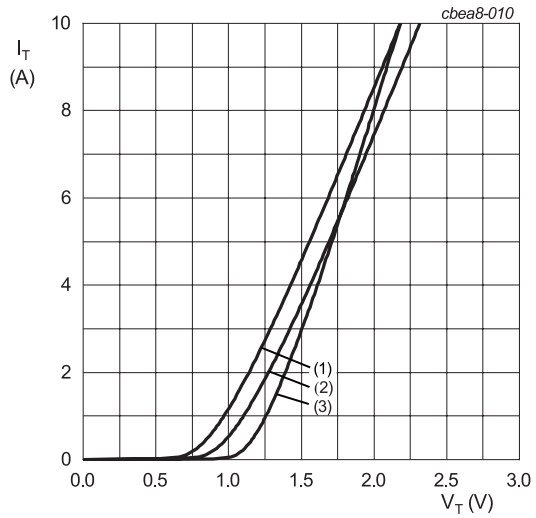


Fig. 9. Normalized holding current as a function of junction temperature



V_o = 0.957 V; R_s = 0.1464 Ω
(1) T_j = 150 °C; typical values
(2) T_j = 150 °C; maximum values
(3) T_j = 25 °C; maximum values

Fig. 10. On-state current as a function of on-state voltage

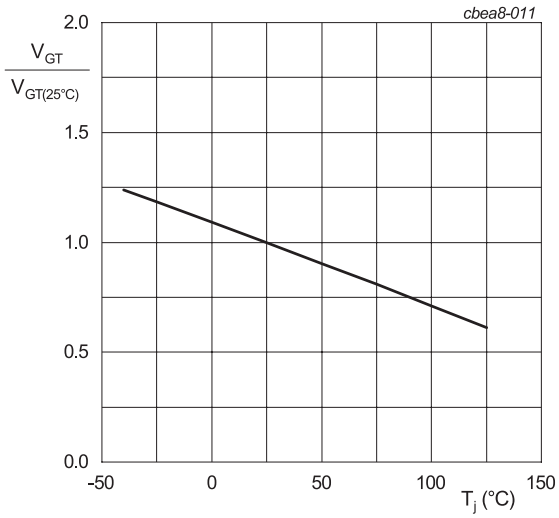


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

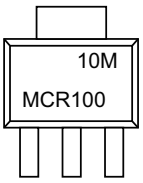
6. Ordering information

Table 5. Ordering information

Type number	Package Name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
MCR100W-10M	SOT223		Reel	1000	SOT223	16-Mar-2006

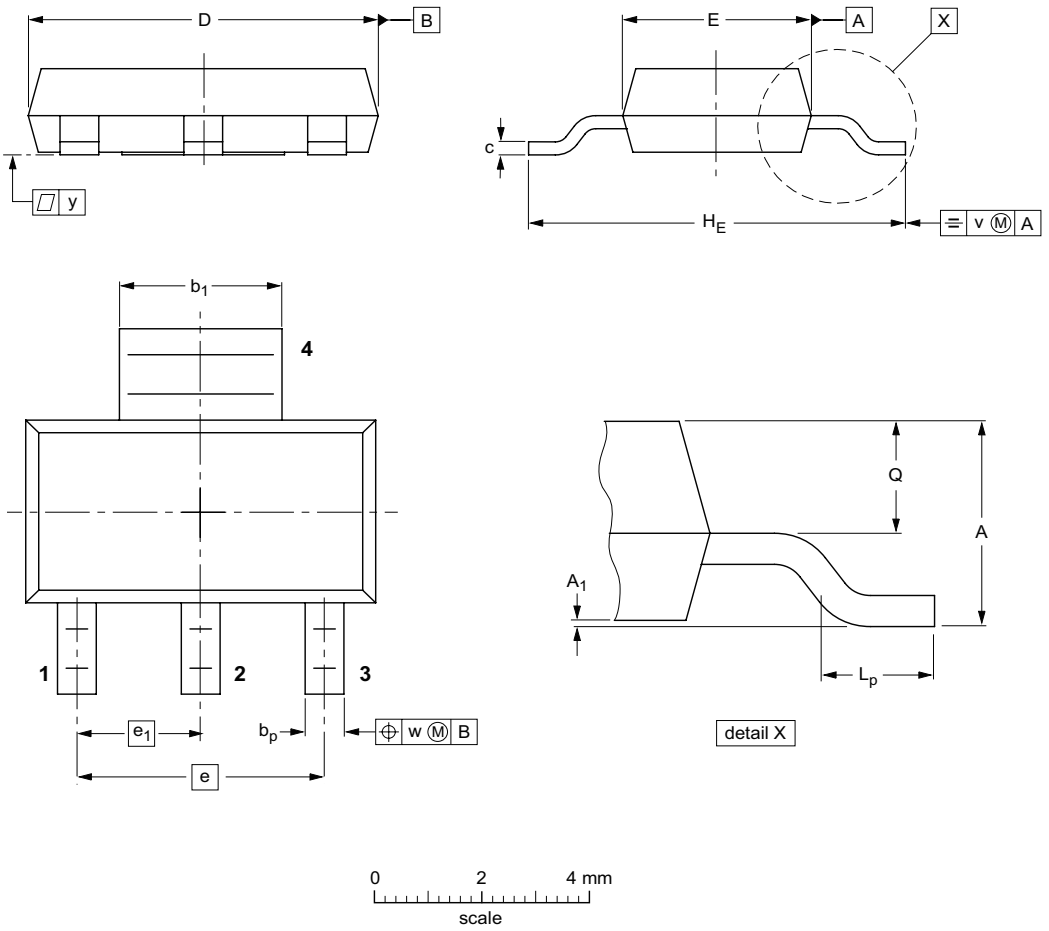
7. Marking

Table 6. Marking codes

Type number	Marking codes
MCR100W-10M	

8. Package outline

Plastic surface-mounted package with increased heatsink; 4 leads **SOT223**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b_p	b_1	c	D	E	e	e_1	H_E	L_p	Q	v	w	y
mm	1.8 1.5	0.10 0.01	0.80 0.60	3.1 2.9	0.32 0.22	6.7 6.3	3.7 3.3	4.6	2.3	7.3 6.7	1.1 0.7	0.95 0.85	0.2	0.1	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT223			SC-73			~~04-11-10~~ 06-03-16

9. Legal information

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Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

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[2] The term 'short data sheet' is explained in section "Definitions".
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Date of release: 27 August 2021

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